NEVADA COOPERATIVE SNOW SURVEYS

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Seasonal Snow-Survey and Forecast of Stream Flow April 1, 1941

Part II. Humboldt River Basin, Central, and Southern Nevada

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Issued in cooperation with the Nevada Agricultural Experiment Station, Division of Irrigation of the Soil Conservation Service, Forest Service, Bureau of Reclamation, Weather Bureau, Geological Survey, Humboldt River Water Users, Nevada State Engineer, and Elko-Lamoille Power Company.

Nevada Agricultural Experiment Station

Reno, Nevada

NEVADA COOPERATIVE SNOW SURVEYS

April 1, 1941

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HUMBOLDT RIVER BASIN

Progress

The main progress made during the year has been that of obtaining a more complete snow survey on the first of April. In the past certain key stations were surveyed April 1 to give an indication of the change in the snow cover during the month. The forecast was therefore based upon the March 1 measurements altered by the general effect noted from the April 1 measurements. The complete survey on April 1 will provide a more accurate means of determining the expected runoff. Its value will increase with years of record. However rough comparisons can be made after the second year.

This year a snow survey bulletin was released for March 1 so that those interested in the results could have them as soon as the measurements were collected and computed. In the past since the forecast was not made until the April 1 results were received, the information was rather old by the time that the official predictions and data were released. By providing two bulletins this fault has been entirely overcome.

The stream flow measurements will be continued as in the past with the State Engineer furnishing a hydrographer to do the field work. The recorders were placed in operation by the 10th of March this year, which gives a more complete record on the early flow than has been possible in the past.

Well measurements have been continued and will form a valuable basis for the study of water losses in the upper Humboldt Basin in later years.

In 1942 the Toiyabe National Forest will organize and maintain a complete snow-survey system for the Reese River Basin. Three snow-survey stations will be established, two on the west slope of the main Toiyabe Range and one on the east slope of Shoshone Range. This system will serve the dual purpose of indicating seasonal water supplies for the Reese River and possible high water on the lower Humboldt.

Upper Humboldt

Present Season

On March 1 the snow cover averaged about 70 percent of normal, the southern tributaries having about 6 percent of normal more than the north. There were no areas where the snow cover was greatly divergent from the average.

On April 1, the average for the upper basin was about 60 percent of the March 1 normal. The snow cover was far heavier and more evenly distributed on the northern tributaries this year than last but on the southern tributaries it was lighter.

In the north, the average was greatly reduced by the total absence of snow on the lower Jack Creek course but was raised by a slight increase on North Fork across the range from the Jack Creek course.

In the south, a decrease in the Harrison Pass area was offset by an increase in the Secret Pass area. Thus the snow-cover average changed but little.

The precipitation during the winter or November-February period was in excess of normal at Tuscarora, North Fork, and Owyhee on the north but was below normal at Wells, Arthur, Elko, Lamoille, and Hylton on the south. The March precipitation was considerably below normal throughout the entire Humboldt Basin.

The temperature departure during the winter averaged 1.4 degrees above normal at Elko. The excess for March at Elko was 1.4° F.

The runoff at Palisade for the November-February period was 21,000 acre feet or a little less than for the same period in 1939-40. The March runoff was about 20,800 acre feet.

The water table levels in Lamoille Valley were lower than for any of the seven years of record, and 1.20 feet lower than a year ago. During March the water table has risen 1.68 ft. The wells along the main upper Humboldt were at about the same level April 1 as a year ago. The data indicate that the water table is low and that considerable water will be used in bringing it back this spring.

The runoff at Palisade last year for the March-July period was 129,370 acre feet, or a little under 52 percent of normal.

Lower Humboldt

In the Little Humboldt Basin the snow cover on March 1 averaged nearly 98 percent of normal. A complete survey on April 1 averaged 87.6 percent of the March 1 normal, which would indicate that a very good seasonal flow of water can be expected. The November-February precipitation at Paradise and Orovada was far above normal but the March precipitation was only about two-thirds of normal.

In the Reese River Basin the winter precipitation at Austin was practically normal but in March was only 55 percent of normal.

In the main Lower Humboldt, as in the Little Humboldt, the winter precipitation was nearly one-half above normal but the March precipitation shrank to approximately 40 percent of normal.

The temperature departure for the winter at Winnemucca was +3.4° F.; during March it was +2.5° F. (mean 42.5° F.)

FORECAST

Humboldt River at Palisade

The snow cover on the northern portion of the Upper Humboldt Basin was far better on March 1 this year than last while that in the Ruby Mountains on the south was practically the same as a year ago. However, on April 1 the snow cover in the south is somewhat less than on this date a year ago, while in the north the snow cover is considerably more.

The water table along the main river is at about the same level as last year. The runoff during March this year is a little greater than last year but the temperature was slightly lower. There was no heavy loss in the snow cover either year.

It is believed that there should be more water yielded by the basin this year than last with conditions as they appear. With normal precipitation during the coming runoff period, it is expected that the yield of the Humboldt at Palisade for the March-July period will be about 150,000 acre feet or approximately 60 percent of normal. Lack of precipitation, however, may result in a decrease to as low as 120,000 acre feet or about 48 percent of normal.

The snow cover on April 1, 1935 was practically a duplicate of the present year. Its runoff for March-July was 146,160 acre feet or 57.2 percent of normal. During this period the temperature was practically normal (departure +0.9° F) but the precipitation was nearly one-half more than normal (141.5 percent).

Lamoille Creek at Power House

The April 1 snow survey indicates that the snow storage is better this year than in 1939 but not as good as in 1937, 1938, or 1940. It is expected that with normal precipitation during the runoff period, Lamoille Creek should yield about 21,000 acre feet for the April-July period or about 82 percent of normal. With a lack of precipitation, the stream should flow at least 18,000 acre feet.

South Fork at Bolton's

From the study of the available data taken over the past four years it appears that the yield of the South Fork at Bolton's should be about 33,000 acre feet for the April-July period. With a lack of precipitation a reduction of yield can be expected.

Martin Creek at U. S. Gaging Station.

Since the snow cover on April 1 is one-third heavier than last year, it is expected that Martin Creek will yield about 19,000 acre feet for the March-July period provided the precipitation during the period is normal. A lack of precipitation may cause a reduction in yield to as low as 14,000 acre feet. The runoff for March was 5,110 acre feet as compared with 4,340 acre foot during March last year.

Northern Tributaries of Upper Humboldt

The runoff of the northern tributaries last year was very poor. This year the snow cover is much better than it was at corresponding dates last year and the flow of the streams should be much better. Sufficient reliable data are not available to warrant making definite forecasts for the northern streams but it appears that they should yield approximately twice as much water as they did last year.

DETAILED DATA

RUNOFF 1940

(Acre Feet)

Mary's River in Cabin Field (April-July)	20,781
North Fork at U. S. Highway 40 (April-July)	5,610
Maggie Creek at U. S. 40 (April-July)	5,412
Susie Creek at U. S. 40 (April-July)	1,138
Starr Creek in Lower Starr Valley (April-July)	10,472
Secret Creek above 71 Ranch (April-July)	5,527
Lamoille Creek at Power House (April-July)	24,930
Lamoille Creek at McIntyre's (April-July)	20,510
Rabbit Creek in Seitz Canyon (May-July)	5,556
South Fork at Bolton Ranch (April-July)	40,400
Humboldt River in Moline Canyon (April-July)	102,090
Humboldt at Palisade (March-July)	129,370
or 51.7 percent of normal (April-July)	111,790)

WINTER RUNOFF 1940-1941

(acre feet)

	Humboldt River at Palisade	Martin Creek at U.S. Gaging Point
	1940-41	1940-41
Nov.	1,570	510
Dec.	2,200	550
Jan.	3,840	555
Feb.	13,346	2,650
Total	21,036	4,265

TEMPERATURE DEPARTURE FROM NORMAL AT ELKO, NEVADA. °F.

1940-41

November	-2.6
December	+4.0
January	0.0
February	+4.0
Average	+1.4

WELL MEASUREMENTS

Lamoille Valley

(Average of 5 wells on March 1)

1935	5.03	ft. below surface of ground
1936	3.72	"
1937	3.57	"
1938	4.50	"
1939	3.92	"
1940	4.50	"
1941	5.70	"

(April 1, 1941 average 4.02 ft.)

Main Humboldt, Elko Co., Average of 7 wells April 1

1938	12.59	ft. from surface of ground to water level
1939	11.53	"
1940	13.24	"
1941	13.19	"

WINTER PRECIPITATION (NOV.-FEB.)

(Inches Water)

I. Upper Humboldt

Northern Feeders

Temperature Departure Elko +1.4°F.

	Marys River		North Fork		
	Jarbidge (6,100 ft.)	Mala Vista (5,585 ft.)	Owyhee (5,400 ft.)	North Fork (6,500 ft.)	Tuscarora (6,400 ft.)
November	1.57	0.17	1.79	0.33	1.14
December	1.62	1.43	1.06	1.52	1.50
January	1.16	0.95	0.89	1.53	1.83
February	1.66	0.63	1.87	1.82	1.69
Total	6.01	3.18	5.61	5.20	6.16
Normal (U. S. W. B.)			5.10	4.64	6.02
Percentage of Normal			110.0	112.1	102.3

Southern Feeders

	Trout-Starr-Secret Creeks			Lamoille-Rabbit		South Fork	
	Wells (5,633 ft.)	Clover Valley (5,800 ft.)	Arthur (6,500 ft.)	Elko (5,077 ft.)	Lamoille (6,230 ft.)	Hylton (7,081 ft.)	Ruby Lake (6,200 ft.)
November	0.79		0.72	0.28	1.25	0.43	0.16
December	1.44		0.83	1.62	1.61	0.85	1.46
January	0.61	0.28	2.43	1.05	0.39	1.04	1.21
February	0.74	0.74	1.44	1.16	1.38	1.09	1.58
Total	3.58	1.02 inc.	5.42	4.11	4.93	3.41	4.41
Normal (U.S.W.B.)	4.00	6.21	7.58	4.43	6.35	5.04	
Percentage of normal	89.5		73.4	92.8	77.9	67.7	

Precipitation slightly above normal on Northern Feeders, but below normal on Southern.

WINTER PRECIPITATION (Nov.-Feb.) Continued

II. Lower Humboldt

Temperature Departure Winnemucca +3.4° F.

	Little Humboldt		Reese River	Main Humboldt			
	Paradise (4,650 ft.)	Orovada (4,300 ft.)	Austin (6,594 ft.)	Battle Mt. (4,513 ft.)	Winnemucca (4,287 ft.)	Rye Patch (4,161 ft.)	Lovelock (3,977 ft.)
November	0.72	1.42	0.59	0.58	0.90	0.60	0.15
December	1.38	1.84	1.24	1.10	1.41	1.63	1.37
January	2.07	1.50	1.29	0.61	1.22	0.65	0.60
February	1.83	1.75	1.07	1.14	1.40	0.61	0.74
Total	6.00	6.31	4.19	3.43	4.93	3.49	2.86
Normal (U.S.W.B.)	4.38	4.09	4.28	2.54	3.70		1.91
Percentage of normal	137.0	154.3	97.9	135.0	133.2		149.7

Precipitation considerably above normal in Little Humboldt Basin and on Main Humboldt; practically normal in Reese River.

MARCH PRECIPITATION

(Inches Water)

I. Upper Humboldt

Northern Feeders

Temperature Departure Elko +1.4° F. (Mean 38.7° F.)

	Marys River		North Fork		
	Jarbidge (6,100 ft.)	Mala Vista (5,585 ft.)	Owyhee (5,400 ft.)	North Fork (6,500 ft.)	Tuscarora (6,400 ft.)
March	0.90	0.52	0.39	0.21	0.35
Normal (U.S.W.B.)			1.20	0.36	1.81
Percentage of normal			32.5	58.3	19.3

Southern Feeders

	Trout-Starr-Secret Creeks			Lamoille-Rabbit Creeks		South Fork Ruby Lake	
	Wells (5,633 ft.)	Clover Valley (5,800 ft.)	Arthur (6,500 ft.)	Elko (5,077 ft.)	Lamoille (6,290 ft.)	Hylton (7,081 ft.)	Ruby Lake (6,200 ft.)
March	1.12	0.27	0.67	0.77	2.11	1.03	0.80
Normal (U.S.W.B.)	1.07	1.18	2.24	0.96	2.83	1.83	
Percentage of Normal	104.7	22.9	29.9	80.2	74.6	56.3	

II. Lower Humboldt

Temperature Departure Winnemucca +2.5° F. (Mean 42.5° F.)

	Little Humboldt		Reese River	Main Humboldt			
	Paradise (4,650 ft.)	Orovada (4,300 ft.)	Austin (6,594 ft.)	Battle Mt. (4,513 ft.)	Winnemucca (4,287 ft.)	Rye Patch Dam (4,161 ft.)	Lovelock (3,977 ft.)
March	0.27	0.02	0.84	0.18	0.42	0.17	0.21
Normal (U.S.W.B.)	0.80	0.98	1.52	0.57	0.96		0.43
Percentage of Normal	33.8	93.9	55.3	31.6	43.8		48.8

Except for occasional stations the March precipitation throughout the entire Humboldt Basin is very low.

MARCH 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN

Temperature departure Nov.-Feb. Elko +1.4° F.

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Normal water content Mar. 1	Percentage of March 1 normal	Seasonal percentage of normal at U.S.W.B. stations Nov.-Feb.
Northern Feeders								
Marys River								Jarbidge-Mala Vista (6,100-5,585 ft)
Bear Creek	8100	Mar. 4	46.2	29.5	14.2			
Fox Creek	6900	Feb. 27	24.1	31.4	7.6	11.3	67.3	
Marys River	8000							
Marys River-North Fork								
Big Bend	6800	Mar. 1	29.4	33.7	9.9	11.5	86.1	
Gold Creek R.S.	6600	Mar. 1	20.1	30.8	6.2	9.4	66.0	
North Fork								Owyhee-North Fork-Tuscarora (6,500-5,400 ft.)
Jack Creek	7800	Mar. 2	28.7	32.7	9.4			
Jack Creek	7000	Mar. 2	10.1	41.7	4.2	7.7	54.5	
Rodeo Flat	7000	Mar. 2	29.5	35.6	10.5			
Fry Canyon	6800	Mar. 2	25.5	36.0	9.2			
Tremewan Ranch	5600	Feb. 28	8.8	36.4	3.2			108.1
Susie-Maggie Creeks								
Taylor Canyon	5200	Feb. 27	21.3	38.7	8.2			
Rock Creek-Little Humboldt								
Midas	7000	Feb. 28	18.7	38.9	7.3			
AVERAGE OF NORTHERN FEEDERS							68.5	108.1

MARCH 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN (Cont.)

Elevation feet	Date	Snow depth inches	Density percent	Water Content Inches	Normal Water content March 1	Percentage of March 1 normal	Seasonal percentage of normal at U. S. W.B. stations Nov.-Feb.
Southern Feeders Trout-Starr-Secret Creeks							Wells-Clover Valley-Arthur (6500-5633 ft.)
Trout Creek 8500	Mar. 6	69.1	36.0	24.9			
Trout Creek 6900	Mar. 3	16.2	40.1	6.5			
Dorsey Basin 8100	Mar. 2	43.5	22.1	9.6	13.0	73.8	
Dry Creek 6500	Mar. 2	19.8	33.3	6.6			
Ryan Ranch 5775	Mar. 3	1.2	37.9	0.4			81.5
Lamoille-Rabbit Creeks							Elko-Lamoille (6,290-5,077 ft.)
Lamoille Canyon 9000	Feb. 28	69.8	32.5	22.7	29.5	76.9	
Lamoille Canyon 9000+	Feb. 28	65.2	32.7	21.3			
Lamoille Canyon 8500	Feb. 27	44.3	34.6	15.3			
Lamoille Canyon 8100	Mar. 1	33.7	33.1	11.2			
Lamoille Canyon 7600	Mar. 1	28.0	33.6	9.4)	12.7	80.3	
Lamoille Canyon 7400	Feb. 26	28.1	36.4	10.2)			85.4

MARCH 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN (Continued)

	Elevation feet	Date	Snow depth inches	Density percent	Water Content ins.	Normal water content March 1	Percentage of March 1 normal	Seasonal Percentage of normal at U.S.W.B. stations Nov.-Feb.
Southern Feeders (Cont.)								
South Fork-Ruby Lake								Hylton-Ruby Lake (7,081-6,200 ft.)
Corral Canyon	8500	Mar. 4	49.0	27.0	13.2			
Green Mountain	8000	Mar. 1	41.1	33.3	13.7			
Harrison Pass No. 2	7400	Feb. 28	21.1	28.5	6.0)	7.9	72.1	
Harrison Pass No. 1	6600	Feb. 27	16.6	32.3	5.4)			
Hager Canyon	8500	Mar. 4	47.5	31.2	14.8			
Cave Creek	7000	Mar. 4						67.7
AVERAGE OF SOUTHERN FEEDERS							74.2*	74.7*

*The average for the Southern Feeders is computed by weighing the three groups of stations representing South Fork, Lamoille Creek, and Starr Creek on the basis of 2, 1, and 1/2 representing their relative contributions to the flow of the main Humboldt.

MARCH 1 SNOW SURVEY DATA

II. LOWER HUMBOLDT BASIN

Temperature Departure Nov.-Feb. Winnemucca +3.4° F.

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Normal water Content Mar. 1	Percentage of Mar. 1 normal	Precipitation (U.S.W.B. percentage Nov.-Feb.)
Little Humboldt Basin								
Lamance Creek	7000	Feb. 26	54.5	34.5	11.9			Paradise-Orovada (4,650-4,300 ft.)
Granite Peak	8600	Mar. 3	45.0	35.0	15.7	13.7	114.6	
Martin Creek R.S.	7000	Feb. 28	24.6	31.6	7.8	8.5	91.8	
Upper Buckskin Mt.	8200	Mar. 1	35.8	37.4	13.4)	12.5	87.2	
Lower Buckskin Mt.	6800	Mar. 2	25.9	32.5	8.4)			
AVERAGE LITTLE HUMBOLDT BASIN							97.9	145.7

Reese River Basin — Snow-Survey Courses planned for 1942..... Austin (6,594 ft.)

97.9

Main Humboldt — Precipitation stations only..... Battle Mountain-Winnemucca-Rye Patch Dam-Lovelock (4,513-3,977 ft.)

139.3

APRIL 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN

Temperature Departure Elko during March +1.4° F. (Mean 38.7°F.)

	Elevation feet	Date	Snow depth inches	Density* percent	Water content inches	Normal water content March 1	Percentage of March 1 normal	Precipitation (U.S.W.B. percentage March normal
Northern Feeders								
Marys River								Jarbidge-Mala Vista (6,100-5,585 ft.)
Bear Creek	8100	Mar. 31	46.5	29.9	13.9			
Fox Creek	6900	Mar. 30	14.4	39.4	5.7	11.3	50.5	
Marys River	8000	Mar. 29	39.8	32.6	13.0			
Marys River-North Fork								
Big Bend	6800	Mar. 26	25.7	37.8	9.7	11.5	84.4	
Gold Creek R.S.	6600	Mar. 26	15.5	39.0	6.0	9.4	63.8	
North Fork								Owyhee-North Fork-Tuscarora (6,500-5,400 ft.)
Jack Creek	7800	Mar. 28	21.5	38.2	8.2			
Jack Creek	7000	Mar. 28	0	0	0	7.7	0	
Rodeo Flat	7000	Mar. 27	22.3	40.0	9.1			
Fry Canyon	6800	Mar. 27	21.5	41.1	8.8			
Tremewan Ranch	5600							36.7
Susie-Maggie Creeks								
Taylor Canyon	5200	Mar. 26	10.6	43.3	4.6			

*The density percent for April is computed from the totals of the course instead of the averages.

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Normal water content March 1	Percentage of Mar. 1 normal	Precipitation (U.S.W.B. percentage Mar. normal)
Northern Feeders (Continued)								
Rock Creek-Little Humboldt								
Midas	7000	Apr. 1	1.8	45.4	0.8			
AVERAGE NORTHERN FEEDERS							49.7	36.7

April 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN (Cont.)

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Normal water content Mar. 1	Percentage of March 1 normal	Precipitation (U.S.W.B. percentage March normal
Southern Feeders								
Trout-Starr-Secret Creeks								Wells-Clover Valley-Arthur (6,500-5,633 ft.)
Trout Creek	8500	Mar. 31	64.8	44.9	29.1			
Trout Creek	6900	Mar. 31	0	0	0			
Dorsey Basin	8100	Mar. 30	40.7	36.6	14.9	13.0	114.6	
Dry Creek	6500	Mar. 31	8.9	34.8	3.1			
Ryan Ranch	5775	Mar. 31	0	0	0			52.5
Lamoille-Rabbit Creeks								Elko-Lamoille (6,290-5,077 ft.)
Lamoille Canyon	9000	Mar. 31	66.8	36.7	24.5	29.5	83.1	
Lamoille Canyon	9000 cross	Mar. 31	61.9	37.1	23.0			
Lamoille Canyon	8500	Mar. 31	45.4	35.2	16.0			
Lamoille Canyon	8100	Mar. 31	32.6	31.2	10.2			
Lamoille Canyon	7600	Mar. 30	25.3	33.2	8.4)	12.7	61.0	77.4
Lamoille Canyon	7400	Mar. 30	26.4	26.[illegible]	7.1)			
South Fork-Ruby Lake								Hylton-Ruby Lake (7,081-6,200 ft.)
Corral Canyon	8500	Mar. 25	49.9	32.5	16.2			
Green Mountain	8000	Mar. 27	35.8	41.7	14.9			
Harrison Pass No. 2	7400	Mar. 26	12.7	[illegible]	4.9)	7.9	[illegible]	
Harrison Pass No. 1	6600	Mar. 26	9.1	37.8	3.4)			

April 1 SNOW SURVEY DATA

I. UPPER HUMBOLDT BASIN (Cont.)

	Elevation feet	Date	Snow Depth inches	Density percent	Water content inches	Normal water content Mar. 1	Percentage of March 1 normal	Precipitation (U.S.W.B. percentage Mar. normal
Southern Feeders (Continued)								
Hager Canyon	8500	Apr. 8						
Cave Creek*	7000	Apr. 8	38.9	41.2	11.9			56.3
AVERAGE SOUTHERN FEEDERS							67.4**	61.8**

*Relocated more favorably regarding snow, but at same elevation.

**The average for the Southern Feeders is computed by weighing the three groups of stations representing South Fork, Lamoille Creek, and Starr Creek on the basis of 2, 1, and 1/2, representing their relative contributions to the flow of the main Humboldt.

April 1 SNOW SURVEY DATA

II. LOWER HUMBOLDT BASIN

Temperature Departure Winnemucca during March +2.5°F. (Mean 42.5.)

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Normal water content March 1	Percentage of March 1 normal	Precipitation (U.S. W.B.) percentage March normal
Little Humboldt Basin								
								Paradise-Orovada (4,650-4,300 ft.)
Lamance Creek	7000							
Granite Peak	8600	Mar. 30	43.5	37.2	16.2	13.7	118.2	
Martin Creek R.S.	7000	Mar. 29	16.0	38.8	6.3	8.5	72.9	
Upper Buckskin Mt.	8200	Mar. 27	29.6	40.6	12.0)	12.5	71.6	
Lower Buckskin Mt.	6800	Mar. 27	16.4	36.0	5.9)			
AVERAGE LITTLE HUMBOLDT BASIN*							87.6	63.9

Reese River Basin — Snow-survey courses planned for 1942 ..... Austin (6,594 ft.) 55.3

Main Humboldt — Precipitations stations only ..... Battle Mountain-Winnemucca-Rye Patch Dam-Lovelock (4,513-3,977 ft.) 41.4

*This survey may well serve the Quinn River Basin which shares the Santa Rosa Mountains watershed equally with the Little Humboldt Basin.

PAST RECORD OF CHANGE OF SNOW COVER AT KEY STATIONS
DURING THE MONTH OF MARCH AS SHOWN BY THE MARCH 1 AND APRIL 1 SNOW SURVEYS
(All figures are inches water depth)

	Northern Feeders			Southern Feeders			Precipitation (U.S.W.B.) Lamoille 6,100 ft.		Temp. Dept. Mar. Elko (5,077 ft.
	Fox Creek (6,900 ft.)	Big Bend (6,800 ft.)	Lamoille (7,400 ft.)	Lamoille (7,600 ft.)	Lamoille (8,100 ft.)	Lamoille (9,000 ft.)	Mar. (normal)	Depart.	norm l . 37.39 F.
1935									
March 1	7.4	9.4	7.6	7.5	8.6	20.4			
April 1	6.9	8.8	-	8.5	11.4	-			
Gain or loss	-0.5	-0.6	-	+1.0	+ 2.8	-	1.47	-0.31	-4.2
1936									
March 1	13.6	16.4	7.1	14.1	17.4	36.5			
April 1	15.9	19.2	14.3	15.9	17.2	33.9			
Gain or loss	+ 2.3	+ 2.8	+ 7.2	+ 1.8	- 0.2	- 2.6	1.17	-1.66	-0.5
1937									
March 1	9.1	9.4	10.3	10.5	12.9	20.3			
April 1	10.9	10.5	-	12.9	16.0	25.4			
Gain or loss	+ 1.8	+1.1	-	+2.4	+ 3.1	+ 5.1	1.91	-0.92	-0.1
1938									
March 1	7.2	8.2	8.9	9.2	10.7	19.0			
April 1	10.6	11.4	15.1	15.3	17.0	29.1			
Gain or loss	+ 3.4	+ 3.2	+ 6.2	+ 6.1	+ 6.3	+10.1	4.00	+1.17	-1.6
1939									
March 1	8.7	7.2	8.6	9.4	12.6	23.4			
April 1	4.5	3.4	2.2	4.5	9.3	21.5			
Gain or loss	-4.2	-3.8	-6.4	-4.9	-3.3	-1.9	1.81	-1.02	-0.9
1940									
March 1	5.7	6.4	7.4	9.1	11.8	20.4			
April 1	3.5	3.8	7.3	9.6	14.3	29.5			
Gain or loss	-2.2	-2.6	-0.1	+ 0.5	+ 2.5	+ 9.1	1.82	-1.01	+2.1

PAST RECORD OF CHANGE IN WATER CONTENT OF SNOW COVER AT KEY STATIONS
DURING THE MONTH OF MARCH AS SHOWN BY THE MARCH 1 AND APRIL 1 SNOW SURVEYS (Continued)

(All figures are inches water depth)

Northern Feeders		Southern Feeders						
Fox Creek (6,900 ft.)	Big Bend (6,800 ft.)	Lamoille (7,400 ft.)	Lamoille (7,600 ft.)	Lamoille (8,100 ft.)	Lamoille (9,000 ft.)	Precipitation (U.S.W.B.) Lamoille 6,100 ft.) Mar. Dept. (normal 2.83 in.)		Temperature Dept. March Elko (5,077 ft.) normal 37.3°F.
1941								
March 1	7.6	9.9	10.2	9.4	11.2	22.7		
April 1	5.7	9.7	7.1	8.4	10.2	24.5		
Gain or loss	- 1.9	-0.2	- 3.1	- 1.0	- 1.0	+ 1.8	2.11	-0.72	+1.4
AVERAGE FOR PERIOD	- 0.2	- 0.01	+ 0.8	+ 0.8	+ 1.5	+ 3.6	2.04	-0.64	- 0.5

RECORD OF CHANGE IN WATER CONTENT OF SNOW COVER
AT ALL STATIONS DURING THE MONTH OF MARCH AS SHOWN BY THE MARCH 1 AND APRIL 1 SNOW SURVEYS
1941-
(All figures are inches water depth)

I. UPPER HUMBOLDT BASIN

Temperature Departure Elko (5,077 ft.) +1.4°F. (Mean 38.7°F.)

Northern Feeders

	Marys River			Marys River-North Fork		
	Bear Creek (8,100 ft.)	Fox Creek (6,900 ft.)	Marys River (8,000 ft.)	Big Bend (6,800 ft.)	Gold Creek R.S. (6,600 ft.)	Precipitation at Jarbidge-Mala Vista (6,100-5,585 ft.) Normal in.
1941						
March 1	14.2	7.6	-	9.9	6.2	
April 1	13.9	5.7	13.0	9.7	6.0	
Gain or loss	- 0.3	- 1.9	-	- 0.2	- 0.2	0.71

	North Fork					
	Jack Creek (7,800 ft.)	Jack Creek (7,000 ft.)	Rodeo Flat (7,000 ft.)	Fry Canyon (6,800 ft.)	Tremewan Ranch (5,600 ft.)	Precipitation at Owyhee-North Fork-Tuscarora (6,500-5,400 ft.) Normal 1.12 in.
1941						
March 1	9.4	4.2	10.5	9.2	3.2	
April 1	8.2	0	9.1	8.8	-	
Gain or Loss	- 1.2	-4.2	- 1.4	- 0.4	- 3.2	0.32

	Susie-Maggie Creeks	Rock Creek-Little Humboldt
	Taylor Canyon (5,200 ft.)	Midas (7,000 ft.)
1941		
March 1	8.2	7.3
April 1	4.6	0.8
Gain or loss	- 3.6	- 6.5

AVERAGE NORTHERN FEEDERS Gain or loss in snow cover -2.1 in.; precip. 0.52 in.; temp. dep. +1.4°F.

RECORD OF CHANGE IN WATER CONTENT OF SNOW COVER
MARCH 1 - APRIL 1 (Cont.)
(all figures are in inches water depth)

I. UPPER HUMBOLDT BASIN (Cont.)

Southern Feeders

Trout-Starr-Secret Creeks

	Trout Creek (8,500 ft.)	Trout Creek (6,900 ft.)	Dorsey Basin (8,100 ft.)	Dry Creek (6,500 ft.)	Ryan Ranch (5,775 ft.)	Precip. at Wells-Clover Valley Arthur (6,500 5,633 ft.) Normal 1.50 in.
1941						
March 1	24.9	6.5	9.6	6.6	0.4	
April 1	29.1	0	14.9	3.1	0	
Gain or loss	+ 4.2	- 6.5	+ 5.3	-3.5	- 0.4	0 39

Lamoille-Rabbit Creeks

	Lamoille (9,000 ft.)	Lamoille (9,000 ft.) cross	Lamoille (8,500 ft.)	Lamoille (8,100 ft.)	Lamoille (7,600 ft.)	Lamoille (7,400 ft.)	Precip. at Elko-Lamoille (6,290-5,077 ft.) Normal 1.90 in.
1941							
March 1	22.7	21.3	15.3	11.2	9.4	10.2	
April 1	24.5	23.0	16.0	10.2	8.4	7.1	
Gain or loss	+ 1.8	+ 1.7	+ 0.7	- 1.0	- 1.0	- 3.1	1.44

South Fork-Ruby Lake

	Corral Canyon (8,500 ft.)	Green Mt. (8,000 ft.)	Harrison Pass #2 (7,400 ft.)	Harrison Pass #1 (6,600 ft.)	Hager Canyon (8,500 ft.)	Cave Creek (7,000 ft.)	Precip. at Hylton-Ruby Lake (7,081-6,200 ft.) Normal inc.
1941							
March 1	13.2	13.7	6.0	5.4	14.8	0	1.83
April 1	16.2	14.9	4.9	3.4	15.6	11.9*	
Gain or loss	+ 3.0	+ 1.2	- 1.1	- 2.0	+ 0.8	-	0.92

*Reclocated where snow cover is more favorable, but same elevation.

AVERAGE SOUTHERN FEEDERS Gain or loss in snow cover -0.03 in.; Precip. 1.02 in.; Temp. departure +1.4° F.

Runoff from Upper Basin at Palisade during March 20,855 A.F. (Normal 40,940 A.F.).

RECORD OF CHANGE IN WATER CONTENT OF SNOW COVER

MARCH 1 - APRIL 1 (Cont.)

(All figures in inches water depth)

II. LOWER HUMBOLDT BASIN

Temperature Departure Winnemucca (4,287 ft,) +2.5°F. (Mean 42.5° F.)

Little Humboldt Basin

	Lamance Creek (7,000 ft.)	Granite Peak (8,600 ft.)	Martin Creek R.S. (7,000 ft.)	Upper Buckskin (8,200 ft.)	Lower Buckskin (6,800 ft.)	Precip. at Paradise-Orovada (4,650-4,300 ft.) Normal 0.89 in.
1941						
March 1	11.9	15.7	7.8	13.4	8.4	
April 1	-	16.2	6.3	12.0	5.9	
Gain or loss	-	+ 0.5	- 1.5	- 1.4	- 2.5	0.60

AVERAGE LITTLE HUMBOLDT. Gain or loss in snow cover -1.3 in.; precip. 0.60 in.; Temp. dep. +2.5°F.; Runoff Martin Creek 5,110 A.F. (Normal 2,300 A.F.)

Reese River Basin — Snow Survey courses planned for 1942..... Precip. at Austin (6,594 ft.) Normal 1.52 in. 0.84

Main Humboldt — Precipitation stations only. Precip. at Battle Mt.-Winnemucca- Rye Patch Dam-Lovelock (4,513-3,977 ft.). Normal 0.65 in.

Runoff at Rye Patch Dam corrected for storage below Palisade 11,464 A.F.* (Normal A.F.) 0.25

By cooperation with the U.S. Bureau of Reclamation, a normal at Rye Patch Dam will be computed for the Forecast of 1942.

* But uncorrected for seepage and evaporation losses (=800 A.F.?). Probable total runoff therefore in excess of 12,000 A.F. On basis of 235 CFS on March 18, runoff for month 14,570 A.F.

FORECAST SUMMARY

	Normal Runoff March-July Acre feet	Probable Flow		Possible Minimum	
		Acre feet	Per-cent of normal	Acre feet	Per-cent of normal
Humboldt River at Palisade	250,000	150,000	60	120,000	48
Lamoille Creek at Power House	22,800	21,000	92	18,000	79
South Fork at Boltons	35,000	33,000	94	29,000	83
Martin Creek near Paradise	14,300	19,000	133	14,000	96

Note:- No maximum is forecasted. In all cases the runoff could readily exceed normal by a considerable amount. The probable flow forecast is based upon the assumption that the precipitation at the U. S. Weather Bureau Stations in the Basin for the March-July period will be normal.

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NORMAL RUNOFF OF MAIN HUMBOLDT AT PALISADE

Based on 24 yr. record 1903-04 to 1926-27
Corr. March 1930 by H. P. Boardman

(Acre feet)

Winter (Nov.-Feb.)		Spring-Summer (March-July)		Late Summer-Autumn (Aug.-Oct.)	
Nov.	6,020	March	40,940	Aug.	4,720
Dec.	6,780	April	56,380	Sept.	2,660
Jan.	8,310	May	63,540	Oct.	4,450
Feb.	15,810	June	69,180		
		July	25,580		
Total	36,920	Total	255,620	Total	11,830

Total annual runoff..... 304,370

REVIEW OF THE 1940 FORECASTS

The following table gives the final results as compiled from data furnished by the U. S. Geological Survey and obtained by the Hydrographer for the Humboldt River employed by the State Engineer's office:

	Normal Flow acre feet	Forecasted Flow acre feet	Actual Flow acre feet	Difference in Percent of Normal
Humboldt River at Palisade (March-July period)	250,000	140,000	129,370	+4.2
Lamoille Creek at Power House (April-July period)	22,800	25,000	24,930	+ 0.3
South Fork, Humboldt River at Bolton Ranch (April-July period)	35,000	38,000	40,400	- 6.9
Martin Creek, Little Humboldt Basin, at U.S. Gaging Station (March-July Period)	14,300	15,000	16,516	- 10.6

Note: The forecast for the South Fork is the first one published and is based upon only three years of record. Extensive studies must be made on the relationship of snow cover to runoff for the Martin Creek drainage, since a change in some of the courses has completely altered the old dependable system that was used in the past. The above forecast for Martin Creek is the first one made based upon new relationships.

The Forecasts for 1940, considered as a whole, were excellent. The goal in forecasting is to be able to come within ten percent of the actual measured flow. This was attained in all but one case, that of Martin Creek, where the forecast was -10.6 percent of normal below the actual. The station that is given the most study and is considered the main one in the Basin is the Humboldt at Palisade for which the forecast was +4.2 percent off.

EASTERN NEVADA

Mean Temperature at Ely (6,257 ft.) Nov.-Feb. 31.1° F.; Mar. 36.2° F.
(Normals and departures not yet available)

Steptoe Valley

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	Mar. 1 normal inches	Percent of March 1 normal	Precipitation (U.S.W.B.) Ely (6,257 ft.)
Murray Summit (near Ely)	7,500	Mar. 1	11.6	36.1	4.2	-	-	Nov.-Feb. .29
		Apr. 1	7.5	9.7*				
Gain or loss					$-\frac{0.7}{3.5}$	-	-	Mar. 0.93 (No normals)

* Newly fallen snow. Old snow had melted.

SOUTHERN NEVADA

Snow-surveying in southern Nevada is being developed to provide a possible forecast of the flow of the artesian springs at the base of the Charleston Mountains. A normal and index measurements of the flow are being developed by the Nevada State Engineer.

Until a weather station is established near the altitude of the snow fields, Las Vegas will be used as a standard station for departure in precipitation and temperature.

LAS VEGAS VALLEY

Temperature Departure Las Vegas (2,033 ft.) Nov.-Feb. +2.8° F. (Normal 50.9° F.); Mar. 0 (Normal 56.8° F.)

Charleston Mountains	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	March 1 normal inches	Percent of March 1 normal	Precipitation (U.S.W.B.) Las Vegas (2,033 ft.) percentage Nov.-Feb.(normal 1.83 in.) 243.2 percentage Mar. (normal 0.43 in.) 367.4
Kyle Canyon	7400	Mar. 4	37.8	31.0	11.7			
		Mar. 27	19.8	35.1	6.9			
		Gain or loss			-4.8			
Kyle Canyon	8200	Mar. 3	60.0	31.5	18.9			
		Mar. 28	51.4	36.0	18.5			
		Gain or loss			- 0.4			
Rainbow Canyon	7800	Mar. 5	70.9	31.6	22.4			
		Mar. 27	58.0	36.8	21.4			
		Gain or loss			- 1.0			
Lee Canyon	8300	Mar. 6	56.1	29.4	16.5			
		Mar. 26	47.6	34.1	16.3			
		Gain or loss			- 0.2			
Lee Canyon	9000	Mar. 7	68.7	30.0	20.6			
		Mar.26	61.2	34.0	20.8			
		Gain or loss			+ 0.2			

VALLEY PRECIPITATION AND TEMPERATURE

The precipitation at Boulder City for the present season corresponds closely with that at Las Vegas but is slightly heavier. For example:

Boulder City (2,525 ft.) Nov.-Feb. 5.31 in.; Mar. 1.79 in.

Las Vegas (2,033 ft.) Nov.-Feb. 4.45 in.; Mar. 1.58 in.

The mean temperature is slightly less. For example:

Boulder City Nov.-Feb. 50.4° F.; Mar. 55.4° F.

Las Vegas Nov.-Feb. 50.9° F.; Mar. 56.8° F.

The reason for the heavier precipitation and lower temperature is doubtless due to the higher elevation of Boulder City. However a complete set of normals will not be available until the coming season.

The heavy snow cover on Charleston Mountains, apparently two and one-half times normal, is an extension of the heavy precipitation that prevailed in southern California and aided storage in Arizona. It should provide a heavy increment to the flow of the springs in Las Vegas Valley.

WILDLIFE REFUGES

By the close cooperation of the U.S. Fish and Wildlife Service and the Division of Irrigation, U. S. Soil Conservation Service, snow-survey systems have been established at the following two refuges in Nevada.

Until normals of precipitation and temperature can be developed, comparison will be made with departures at the standard stations of Cedarville, California and Elko, Nevada.

Sheldon National Antelope Refuge (Northern Washoe County

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	March 1 normal inches	Percent of March 1 normal
Bald Mountain	6,720	Feb.27	21.6	27.5	5.9		
Peterson Canyon		Mar.28	11.6	33.1	3.8		
and	Gain or loss				-2.1		
Bald Mt. Creek							
Mahogany Mt.	5,680	Feb.27	16.9	31.2	5.3		
Virgin		Mar.28	0	0	0		
	Gain or loss				- 5.3		

Precipitation (U.S.W.B.)		Temperature (U.S.W.B.)	
Sheldon (6,500 ft.)	Cedarville (4,675 ft.)	Sheldon (6,500 ft.)	Cedarville (4,675 ft.)
Nov.-Feb.	Nov.-Feb.	Nov.-Feb.	Nov.-Feb.
Mean 3.85 in.	Normal 6.23 in.	Mean 29.4°F.	Normal 34.0° F.
Seas. percentage -	Seas. percentage 92.9	Departure -	Departure - 0.1° F.
March	March	March	March
Mean 0.15 in.	Normal 1.47	Mean 34.8° F.	Normal 40.1° F.
Seas. percentage -	Seas. percentage -	Departure -	Departure -

Ruby Lake National Wildlife Refuge (Southern Elko County)

	Elevation feet	Date	Snow depth inches	Density percent	Water content inches	March 1 normal inches	Percent of March 1 normal
Hager Canyon	8500	Mar. 4	47.5	31.2	14.8	-	-
		Apr. 8	41.0	38.1	15.6	-	-
	Gain or loss						
Cave Creek	7000	Mar. 4	0	0	0	-	-
		Apr. 8*	28.9	41.2	11.9		
	Gain or loss				-		

* Course relocated in more favorable snow cover at same elevation

Precipitation (U.S.W.B.)		Temperature (U.S.W.B.)	
Ruby Lake (6,200 ft.)	Elko (5,077 ft.)	Ruby Lake (6,200 ft.)	Elko (5,077 ft.)
Nov.-Feb.	Nov.-Feb.	Nov.-Feb.	Nov.-Feb.
Mean 4.41 in.	Normal 4.43 in.	Mean 30.4° F.	Normal 28.3° F.
Seas. pctg. -	Seas. pctg. 92.8	Departure -	Departure +1.4° F.
March	March	March	March
Mean 0.80 in.	Normal 0.96	Mean 38.2° F.	Normal 37.3° F.
Seas. pctg. -	Seas. pctg. 80.2	Departure -	Departure +1.4°F.

PART I. CENTRAL SIERRA QUADRANGLE

Part I, embracing the eastern slope of the Central Sierra Quadrangle, is issued separately by the Forecast Committee of the Nevada Cooperative Snow Surveys and can be obtained upon request to the Chairman, Prof. H. P. Boardman, 735 West Street, Reno, Nevada.

Nevada Agricultural Experiment Station
Reno, April 15, 1941

Carl Elges, Forecaster

J. E. Church, Adviser

Seasonal Snow Survey and Forecast of Stream Flow

April, 1941

Nevada Co-operative Snow Surveys

PART I.—CENTRAL SIERRA QUADRANGLE

Including the Truckee, Tahoe, Carson and East and West Walker Basins of the Eastern Slope

CO-OPERATION

The organizations cooperating this year in the surveys of this region are: The Nevada Cooperative Snow Surveys, including the State of Nevada, through the State Engineer's office, the Truckee-Carson Irrigation District, the Washoe County Water Conservation District and the Sierra Pacific Power Co.; the California Cooperative Snow Surveys headed by the Division of Water Resources of the Department of Public Works at Sacvramento and including the Pacific Gas & Electric Co. and the Nevada Irrigation District, whose employees make the surveys of several of the courses used in this forecast; The U. S. Forest Service; and the Division of Irrigation of the U. S. Soils Conservation Service. This is the organization which is developing and coordinating the snow surveys throughout the western states. All of the above organizations contribute financially to the work.

The U. S. Weather Bureau and the Agricultural Experiment Station at the University of Nevada are also cooperating in various ways.

Part II. Humboldt Basin and Miscellaneous is prepared by Carl Elges and Dr. Church of the Agricultural Experiment Station. University of Nevada.

REVIEW OF LAST YEAR

As will be seen by the table of 1940 results the Truckee River runoff and the rise of Tahoe were considerably more than was forecast. In making the forecast too little attention was paid to winter rains largely in January and during the last week of March, much of which fell above 7000 feet altitude and some as high as 8000 feet.

September and October 1939 were above normal in precipitation but November and December were deficient. However, the January, February and March precipitations were all so high as to bring the total for winter far above normal. This was not evident from the snow surveys because of so much rain. A tabulation of the December-March precipitation for six stations, Tahoe, Truckee, Soda Springs, Bowman Dam, Lake Spaulding and Blue Canyon showed from 158% to 179% of normal.

The excess above normal expressed quantitatively amounted to about 12" depth of water at Tahoe and Truckee and from 24" to 31" at the other four stations. The winter runoff during January, February and March was considerably above normal due to the winter rains but much of this rainfall must have been stored in the ground until spring as the excess precipitation far surpassed the excess winter runoff plus the surplus April-July runoff above that forecast.

The Carson and Walker rivers discharges checked the forecasts very well as shown by the following table.

1940 RESULTS

BASIN OR STREAM	Normals	1940 Forecast		Actual Results	
		% of Normal	Amount	Amount	% of Normal
	Feet		Feet	Feet	
*Rise of Tahoe April 1 to High Water	1.68	82.2	1.38	1.60	95.2
Tahoe Maximum Elevation		June 25	6,228.10	6,228.32	
	Acre Ft.		Acre Ft.	Acre Ft.	
Truckee ezclusive of Tahoe	323,700	75.2	245,000	304,400	93.5
Carson at Ft. Churchill	230,000	80.4	185,000	184,230	80.1
West Walker at Chris Flat	191,200	80.0	153,000	162,420	84.9
East Walker at Bridgeport Dam	73,000	71.2	52,000	55,730	76.3

*Assuming gates closed; no outflow. Actual high water was 6228.31 June 27-29. With gates closed it would have been 6228.32 June 27-July 3, practically stationary for seven days before starting to fall because of evaporation exceeding inflow plus precipitation.

OUTLOOK FOR 1941

The Fall precipitation, October-November, 1940, averaged slightly above normal for the following six stations, Tahoe City, Truckee, Soda Springs, Bowman Dam, Lake Spaulding and Blue Canyon. The December precipitation was unusually heavy so that the February 1st snow surveys showed higher water content at most of the snow courses than for the same dates the previous winter and the high level courses were nearly all well ahead of last year in early March.

However, some winter rains and above normal February temperature brought most of the low altitude courses below last year's record by March first and deficient March precipitation has helped keep most of the Truckee and Tahoe courses, both high and low altitude, appreciably under last season's record in April 1st water content.

1941

PROGRESS SNOW SURVEYS DRRING THE WINTER

Basin	Snow Course	1941 Date of Snow Survey	Depth of Snow Inches	Density of Snow % Water	Water Content Inches	April 1 Normal Water Content Inches	% of Apr. 1 Norm. 1941	Last Year % of Apr. 1 Norm.	Last Year Date
South Yuba Normals and % of Normals related to Truckee River	Furnace Flat	1/30/41	111.0	37.5	41.6	(59)	70.5	30.5	1/30/40
		3/ 5/41	134.5	39.6	53.2	(59)	90.2	74.7	3/ 5/40
	Fordyce Lake	1/29/41	97.5	35.7	34.8	(51)	68.2	27.8	1/30/40
		3/ 6/41	115.0	37.7	43.4	(51)	85.1	70.4	3/ 4/40
	Soda Springs	1/31/41	93.3	36.2	33.8	(42)	80.5	39.5	1/31/40
		3/ 3/41	111.7	38.9	43.4	(42)	103.3	91.0	3/ 1/40
	Summit	1/31/41	96.0	38.4	36.9	47.8	77.2	39.3	1/31/40
		3/ 3/41	119.4	37.3	44.5	47.8	93.1	90.0	3/ 1/40
Truckee	Independence Lake	2/ 1/41	92.4	36.0	33.3	(47)	70.9	51.3	2/ 9/40
		3/ 6/41	125.8	36.8	46.3	(47)	98.5	86.5	3/ 3/40
	*Independence Camp	1/31/41	54.1	33.0	17.9	(26.5)	67.5		
		3/ 5/41	66.3	34.4	22.8	(26.5)	86.0		
	Independence Creek	1/31/41	39.6	30.2	12.0	(18)	66.7	43.3	2/ 8/40
		3/ 7/41	39.9	34.1	13.6	(18)	75.6	74.4	3/ 4/40
	Sage Hen Creek	2/ 2/41	47.2	31.5	14.9	(22)	67.7	49.1	2/10/40
		3/ 5/41	53.9	33.6	18.1	(22)	82.3	80.5	3/ 5/40
	Boca	2/ 3/41	15.9	34.3	5.1	(9)	56.7		
		3/ 2/41	12.1	40.5	4.9	(9)	54.4	67.8	3/ 2/40
	Truckee No. 2	4/ 3/41	39.0	31.4	13.1	(20)	65.5		
		3/ 2/41	47.1	30.8	14.5	(20)	72.5	85.0	3/ 2/40
Tahoe	Tahoe City	2/ 2/41	29.5	34.2	10.1	15.9	63.5	48.4	2/ 1/40
		3/ 6/41	35.6	34.0	12.1	15.9	76.1	101.3	3/ 1/40
	Ward Creek	2/ 1/41	93.7	39.2	36.7	51.2	71.7	54.3	2/ 8/40
		3/ 8/41	114.3	42.3	48.4	51.2	94.5	86.4	3/ 3/40
	Marlette Lake	2/ 1/41	59.7	35.5	21.2	27.8	76.3	65.5	2/ 1/40
		3/ 1/41	64.2	38.3	24.6	27.8	88.5	108.3	3/ 1/40
	Glenbrook	2/ 2/41	30.9	24.9	7.7	(14)	55.0	56.4	2/ 1/40
		3/ 2/41	35.3	22.9	8.1	(14)	57.9	87.1	3/ 2/40
	Daggett's Pass	2/ 2/41	30.7	30.0	9.2	16.3	56.4	54.6	2/ 1/40
		3/ 2/41	43.7	27.2	11.9	16.3	73.0	94.5	3/ 2/40
	Freel Bench	2/ 1/41	29.3	31.7	9.3	(15)	62.0		
		3/ 1/41	36.3	27.8	10.1	(15)	67.3	89.4	3/ 3/40
	Upper Truckee	2/ 1/41	28.6	28.0	8.0	(11)	72.7	67.3	2/ 2/40
		3/ 1/41	32.5	27.7	9.0	(11)	81.8	100.0	3/ 3/40
	Richardson's	2/ 1/41	28.0	35.0	9.8	(16)	61.3	37.5	2/ 1/40
		3/ 1/41	31.0	27.4	8.5	(16)	53.1	73.8	3/ 2/40
Carson	Carson Pass	1/29/41	79.9	34.4	27.5	(48)	57.3	44.0	1/27/40
		2/26/41	91.4	38.4	35.1	(48)	73.1	79.0	3/ 1/40
	Blue Lakes	1/31/41	98.1	33.7	33.1	48.1	68.8	48.4	1/31/40
		3/ 5/41	147.3	31.5	46.4	48.1	96.5	82.3	2/29/40
Mono	Tioga Pass	2/26/41	90.0	35.7	32.1	(31)	103.5		
Owens	Miscellaneous	2/15/41			about 107% of seasons normal.				

* New courses.
( ) Tentative normals.

These comparative results can be checked by a study of the two following large tables showing Winter progress and April 1 snow survey data.

The Carson Courses are about the same as last year and the Walker Basin is in general considerably better than last year. This is in harmony with the western slope of the Sierras which likewise shows a general progressive improvement to the south.

Probably the ground water storage was greater last spring than this year so the forecasts this year are a little less for the Carson and considerably less for the Truckee and Tahoe than was actually realized last year. The Walker Basin forecasts are somewhat above the runoffs realized last year.

The early April precipitation is above normal but the temperature has been subnormal and that tends to not only retard melting and runoff but if it continues will probably result in some actual loss of runoff unless May temperatures are above normal.

TRUCKEE RIVER

The probable natural April—July discharge of the Truckee River at Farad exclusive of Tahoe discharge, (which is controlled by gates) and corrected for storage in Boca reservoir and Independence Lake is estimated at 260,000 Acre feet distributed approximately as shown in the accompanying table.

April	65,000 Acre Ft.
May	105,00 Acre Ft.
June	72,000 Acre Ft.
July	18,000 Acre Ft.
Total	260,000 Acre Ft.

Boca reservoir contained about 7745 Acre feet on April 1.

TAHOE

Tahoe was at elevation 6227.04 on April 1, which is .32 ft. or nearly four inches higher than on the same date last year. It is estimated to reach a maximum of 6228.30 about June 25.

CARSON RIVER

Lahontan Reservoir contained 230,700 Acre feet on April 1 and the estimated discharge of the Carson River at Fort Churchhill is 175,000 Acre feet for April-July.

WALKER BAISIN

The West Walker will probably discharge about 187,000 Acre feet at Chris Flat during April—Julv. The Topaz re[s]
contained 36,200 Acre feet April 1.

Bridgeport Reservoir contained 35,700 Acre feet April 1 and the estimated yield of the East Walker River at Bridgeport Da[m]
for the April—August period is 67,000 Acre feet.

APRIL 1, 1941 SNOW SURVEY DATA

SNOW SURVEY STATIONS	Elevation Feet	Date of 1941 Snow Survey	Depth of Snow Inches	Density of Snow % Water	Water Content Inches	April 1 Normal Water Content Inches	1941 Seasonal % of Normal	Last Year % of Normal
TRUCKEE BASIN								
Crest and South Yuba								
Furnace Flat	6600	March 27	101.4	49.1	49.8	(59)	84.4	76.3
Fordyce Lake	6500	March 25	88.5	46.2	40.9	(51)	80.2	70.8
Soda Springs	6750	March 28	83.0	49.8	41.3	(42)	98.3	101.7
Summit	6900	March 28 to 31	86.0	49.1	42.2	47.8	88.3	101.7
Ward Creek	7000	March 29	102.2	45.4	46.4	52.7	88.0	100.0
Little Truckee								
Webber Peak	8000	April 8	127.5	43.1	54.9	56.9	96.5	92.1
Webber Lake	7000	April 8	88.7	46.1	40.9	38.1	107.3	101.6
Independence Lake	8200	March 30	107.3	41.7	44.7	(47)	95.1	107.7
Independence Camp *	7000	March 30	45.6	46.5	21.2	(26.5)	80.0	
Independence Creek	6500	March 31	23.0	44.3	10.2	(18)	56.7	50.0
Sage Hen Creek	6500	March 29	39.2	41.8	16.4	(22)	74.5	75.5
Eastern Outposts								
Granite Peak	8200	March 30	47.0	38.5	18.1	24.7	73.3	94.3
Big Meadow	8800	March 28	46.8	48.3	22.6	28.1	80.4	112.8
Mt. Rose	9000 to 10,000	March 29 & 30	73.0	43.2	31.5	(45)	70.0	89.3
Lower Levels								
Boca	5900	March 29	Trace	.....	.....	(9)	0	0
Truckee No. 2	6400	March 29	28.9	43.2	12.5	(20)	62.5	63.5
Tahoe City	6250	March 31	14.6	41.8	6.1	15.9	38.4	69.2
TAHOE BASIN								
Crest Main Sierra								
Ward Creek	7000	March 29	102.2	45.4	46.4	51.2	90.6	102.9
Rubicon Peak No. 1	8100	March 30	114.9	36.4	41.8	48.9	85.5	113.3
Rubicon Peak No. 2	7500	March 30	73.9	44.0	32.5	(40)	81.3	95.8
Lake Lucile	8400	April 1	149.2	42.6	63.5	61.2	103.8	113.2
Echo Summit *	7500	March 30	87.2	42.7	37.2	(40)	93.0	98.8
Eastern Outposts	9000 to							
Mt. Rose	10,000	March 29	73.0	43.2	31.5	(45)	70.0	89.3
Marlette Lake	8000	April 1	59.6	44.8	26.7	27.8	96.0	121.2
Hagan's Meadows	8000	March 30	41.9	40.6	17.0	21.2	80.2	89.6
Lower Levels								
Tahoe City	6250	March 31	14.6	41.8	6.1	15.9	38.4	69.2
Rubicon No. 3	6700	March 30	56.5	38.2	21.6	(36)	60.0	67.5
Richardson's	6500	March 31	24.3	31.7	7.7	(16)	48.1	41.9
Upper Truckee	6400	March 30	11.1	37.8	4.2	(11)	38.2	34.1
Freel Bench	7300	March 30	17.8	39.3	7.0	(15)	46.7	58.0
Daggett's Pass	7350	March 29	27.7	35.4	9.8	16.3	60.1	85.3
Glenbrook	6700	March 29	29.1	28.5	8.3	(14)	59.3	75.0
CARSON BASIN								
Crest								
Carson Pass	8600	April 1	96.3	43.2	41.6	(48)	86.7	81.9
Blue Lakes	8000	March 31	112.1	40.6	45.5	48.1	94.6	95.0
WALKER BASIN								
West Walker								
Sonora Pass	8800	March 28	73.1	40.6	29.7	(31)	95.8	91.0
Leavitt Meadow	7200	March 27	31.8	46.5	14.8	(16)	92.5	40.0
Willow Flat	8250	March 29	42.5	39.5	16.8	17.5	96.0	76.0
East Walker								
Center Mountain	9400	April 2	121.1	36.8	46.8	45.7	102.4	98.0
Buckeye Forks	8500	April 1	66.9	38.7	25.9	26.0	99.6	65.8
Buckeye Roughs	7900	April 1	59.1	41.6	24.5	25.9	94.6	76.1
Dunderberg Peak	8400	March 30	64.3	40.6	26.1	(45)	58.0	60.9
MONO BASIN								
Crest								
Tioga Pass	9900	March 29	89.7	42.8	38.4	(31)	123.9	112.6

* New courses.

( ) Tentative normals.

FORECAST CENTRAL SIERRA—EASTERN SLOPE
APRIL - JULY. 1941

BASIN	Normal Runoff Acre Ft.	Seasonal Runoff Probable % of Normal	Probable Acre Feet	* Possible Minimum % of Normal	* Possible Minimum Acre Feet
§Truckee at Farad, exclusive of Tahoe	325,700	79.8	260,000	73.7	240,000
†Rise of Tahoe, April 1 to High Water	1.68 ft.	75.0	1.26	65.5	1.10 ft.
†Tahoe High Water Elevation	About June	25	6228.30		6228.14
Marlette Lake		96			
Carson at Ft. Churchhill	230,000	76.1	175,000	69.6	160,000
West Walker near Chris Flat	191,200	97.8	187,000	88.9	170,000
‡East Walker at Bridgeport Dam	73,000	91.8	67,000	82.2	60,000

* These, or even lower runoffs may result from abnormally low spring temperatures or deficient precipitation but this year early April precipitation is ahead of normal so probably April-June precipitation will equal or exceed normal.

§ Including changes in Boca Reservoir Storage.

† Assuming outlet gates kept closed; no outflow.

‡ The forcast period for the East Walker is April-August because of late melting of snow in high altitudes and northeastern slopes of the Saw Tooth Range West of Bridgeport.

Distribution of April-July Runoff in Typical Streams—Per Cent of Total April-July Runoff

	Truckee at Iceland Excl. of Tahoe	Carson at Clifton	West Walker at Coleville
April	30	19	11
May	37	36	29
June	25	34	37
July	8	11	23
April-July	100.0	100.0	100.0

A retardation in the earlier months of the series assures an increase in the later months and vice versa.

ESTIMATED LAKE TAHOE ELEVATIONS FOR 1941

Dates	Elevations	Remarks
April 1	6227.04	Actual
April 10	7.14	Actual
April 19	7.18	Actual
May 1	7.26	Estimated
May 15	7.46	Estimated
June 1	7.86	Estimated
June 15	8.23	Estimated
June 25	6228.30	Estimated

Table A, below, shows what Lake Tahoe is able to supply at various elevations with gates wide open. Table B, below, shows the need of drawing from the lake during the summer and fall to maintain a flow of 500 cubic feet per second at Iceland.

A. Draft Possible at Various Elevations

Elev. (Ft.)	Draft (C.F.S.)	Elev. (Ft.)	Draft (C.F.S.)
6223.0	0	6225.5	520
6223.5	24	6226.0	730
6224.0	88	6227.0	1160
6224.5	183	6228.0	1600
6225.0	325	6229.0	2060

One foot depth on Tahoe is equivalent to 123,300 acre feet.

B. Natural flow of Truckee River at Farad, Exclusive of Tahoe (Much Affected by Rains) August-October

	Normal Acre Feet	Second Feet
August	7485	122
September	5800	98
October	6545	106

WINTER PRECIPITATION

*Typical Progress through winter for Central Sierra Region:

Dec.-March Date	Dec.-March % Due	Nov.-March % Due	Nov.-March Date
Dec. 1	0	11	Dec. 1
Jan. 1	23	31	Jan. 1
Feb. 1	52	58	Feb. 1
Mar. 1	77	80	Mar. 1
Apr. 1	100	100	Apr. 1

Seasonal Progress

†Tahoe City Precipitation, Dec.-March, 1940-1941:

Date	% of Seasonal	Actual Inches	% of Normal Due
Jan. 1	48	10.12	192
Feb. 1	71	15.04	126
Mar. 1	90	19.03	108
Apr. 1	100	21.16	92

*Based on 60 years precipitation records at Colfax and 50 years at Truckee.

†U. S. Weather Bureau observations. Normal Nov.-Mar. precipitation at Tahoe City, adjusted for 60 years by comparison with Colfax for same 21 years as available at Tahoe City is 25.75 inches and 22.9 inches for Dec.-Mar.

N. B.—Use Dec.-Mar. Table except when November precipitation leaves a substantial quantity of winter snow in the mountains.

Reno, Nevada, April 19, 1941.

ASK FOR MORE COPIES IF NEEDED.

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Forecast Committee
Nevada Co-operative Snow Surveys.